

1970

OPERATING SUMMARY

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STRATFORD

water pollution control plant

ONTARIO WATER RESOURCES COMMISSION

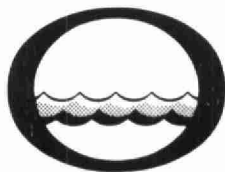
Division of Plant Operations

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Water management in Ontario

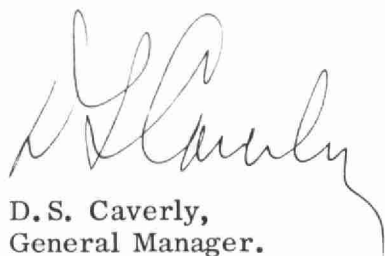
Ontario
Water Resources
Commission

135 St. Clair Ave. W.
Toronto 195
Ontario

Once again we have the privilege of submitting to you our latest detailed report on financial progress and technical activity at your water pollution control plant.

The statistical information contained in this annual operating summary will undoubtedly be a useful barometer of efficiency. Of particular interest will be the comments and recommendations of the regional operations engineer, who was intimately connected with day-to-day operation throughout 1970.

Together with the extensive cost data provided, this information should assist greatly in your general understanding of the problems met and dealt with, and in furnishing a yardstick for possible future expansion.



D.S. Caverly,
General Manager.



D.A. McTavish, P. Eng.,
Director,
Division of Plant Operations.

CONTENTS

Title page.	1
Flow diagram	2
Design data	3
'70 Review	4
Project costs	6
Process data	9

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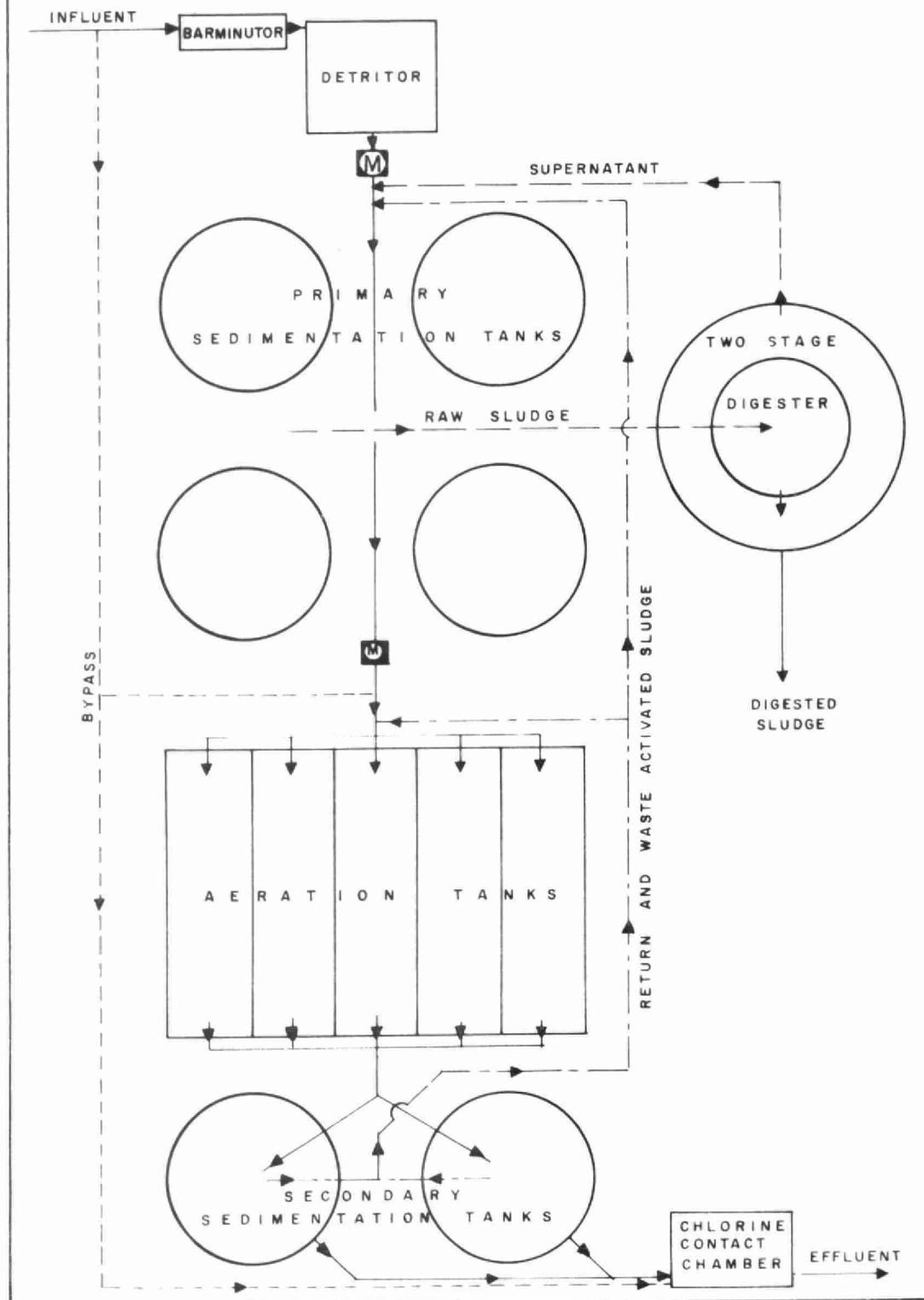
THE CITY OF STRATFORD

by the

ONTARIO WATER RESOURCES COMMISSION

1970 ANNUAL OPERATING SUMMARY

STRATFORD WATER POLLUTION CONTROL PLANT



DESIGN DATA

PROJECT NO.	2-0002-57	TREATMENT	Activated Sludge
DESIGN FLOW	6.0 mgd	DESIGN POPULATION	30,000
BOD - Raw Sewage	140 mg/l	SS - Raw Sewage	250 mg/l
- Removal	90%	- Removal	95%

PRIMARY TREATMENT

Comminution

Type: Barminutor
Size: One Model C (36")

Grit Removal

Type: Dorr detritor
Size: One 20' x 20' x 1' (2,500 gal)
Retention: 0.9 min

Primary Sedimentation

Type: Infilco
Size: Four 80' dia x 10 $\frac{1}{2}$ ' swd (1.32 mil gal)
NOTE: Two used for storm flows only
Retention: 2.7 hr (2 cl)
Loading: Surface, 600 gal/ft²/day
Weir, 12,000 gal/ft/day

SECONDARY TREATMENT

Aeration Tanks

Type: Diffused air; triple-pass
Size: Five 85 $\frac{1}{2}$ ' x 25' 8" (avg) x 13' (0.97 mil gal)
Retention: 3.9 hr

Diffusers

Type: Activated Sludge Ltd.
Alundum Domes

Air Supply

Type: Roots-Connersville
Size: Three 1750 cfm

Secondary Sedimentation

Type: Infilco
Size: Two 80' dia x 11' 3" swd (0.705 mil gal)
Retention: 2.7 hr
Loading: Surface, 600 gal/ft²/day
Weir, 12,000 gal/ft/day

CHLORINATION

Chlorine Contact Chamber

Size: 67' x 27' x 8' (90,000 gal)
Retention: 22 min

Chlorinator

One F & P 500 lb/day

OUTFALL

- to Avon River

SLUDGE HANDLING

Digestion System - Heated, two-stage

Type: Gas mixed
Size: One 73' dia x 26' swd (100,000 cu ft or 0.624 mil gal)

Primary Stage (inner)

Size: 67,600 cu ft
Loading: 2.8 lb/cu ft/mo

Secondary Stage (outer ring)

Size: 32,400 cu ft
Total Loading: 1.9 lb/cu ft/mo

'70 REVIEW

FLOWS	DAILY FLOW mil gal	OCCURRING IN THE MONTH OF	MONTHLY FLOW mil gal	OCCURRING IN THE MONTH OF
Average	3.22	—	98.2	—
High	4.91	April	147.9	April
Low	2.38	August	74.0	August

GENERAL

The average daily flow for the year of 3.22 million gallons was 0.38 million gallons less than that of 1969. In 1970 the plant treated a total of 1,170.1 million gallons of sewage at a total cost of \$80,122.67. The operating cost per million gallons was \$68.01 and the cost per pound of BOD removed was four cents.

During the early part of 1970 there were frequent occasions when oil was received at the WPCP, which interfered with the plant operation. Although the discharge lessened toward the latter part of the year, there were still occasions when oil spillage to the sewer system occurred.

PLANT FLOWS and CHLORINATION

The average daily flow of 3.22 million gallons decreased approximately 10% from 1969. The daily design flow was exceeded 9% of the time.

Despite the decrease in flow, the amount of grit removed increased to an average of 50 cubic feet per month. The average dosage rate required to produce an average chlorine residual of 0.5 mg/l after a 15 minute contact time was 2.3 mg/l.

PLANT EFFICIENCY

The raw sewage BOD averaged 154 mg/l with the design raw sewage BOD concentration of 140 mg/l being exceeded 55% of the time.

The raw sewage suspended solids averaged 238 mg/l with a design raw sewage suspended solids concentration of 250 mg/l being exceeded approximately 35% of the time.

The average BOD and suspended solids in the effluent were 7 mg/l and 12 mg/l respectively. Reductions of 95% in both BOD and suspended solids were experienced in 1970 compared with 92 and 93% for each in 1969. The average final effluent BOD and suspended solids were well within the OWRC objectives of 15 mg/l for each. The average BOD in the final effluent exceeded the OWRC objective by 21% of the time and the suspended solids exceeded the OWRC objective 30% of the time.

SLUDGE DIGESTION and DISPOSAL

A total of 13,667 cubic yards of sludge was disposed on farm land during 1970. The average total solids concentration in the raw sludge was 6.7% while in the digested sludge it was 5.1% with the volatile solids reduction being 39%.

CONCLUSIONS and RECOMMENDATIONS

The plant produced an excellent effluent with BOD and suspended solids concentrations meeting the OWRC objectives.

Due to the numerous occasions of oil spillage, it is recommended that the City of Stratford initiate an industrial waste survey program.

The consulting engineer has submitted a proposal for tertiary treatment facilities at the plant and it is expected that plans will be finalized in 1971.

PROJECT COSTS

NET CAPITAL COST (Final)	\$925,309.42
DEDUCT - Portion financed by CMHC/MDLB (Final)	<u>309.42</u>
Long Term Debt to OWRC	<u>\$925,000.00</u>
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1970	<u>\$317,779.94</u>
Net Operating	\$ 80,122.67
Debt Retirement	18,677.00
Reserve	-
Interest Charged	<u>51,824.25</u>
TOTAL	<u>\$150,613.92</u>

RESERVE ACCOUNT

Balance @ January 1, 1970	\$ 84,455.10
Deposited by Municipality	-
Interest Earned	<u>5,550.71</u>
	\$ 89,995.81
Less Expenditures	<u>-</u>
Balance @ December 31, 1970	<u>\$ 89,995.81</u>

1970 OPERATING COSTS

• PAYROLL	62 %
• FUEL	%
• POWER	11 %
• CHEMICALS	2 %
• GENERAL SUPPLIES	5 %
• EQUIPMENT	1 %
• REPAIRS & MAINTENANCE	3 %
• SUNDRY	15 %
• WATER	< 1 %
• TRAVEL	< 1 %

TOTAL ANNUAL COST

NET OPERATING	53 %
DEBT RETIREMENT	12 %
INTEREST	35 %
RESERVE FUND	%

Yearly Operating Costs

YEAR	MILLION GALLONS TREATED	TOTAL OPERATING COSTS	COST PER MILLION GAL	COST PER LB OF BOD REMOVED
1966	1120.8	\$59,148.93	\$52.77	2 cents
1967	1586.6	65,593.65	42.37	2 cents
1968	1232.1	69,371.20	56.30	2 cents
1969	1322.5	75,996.47	57.46	6 cents
1970	1178.1	80,122.67	68.01	4 cents

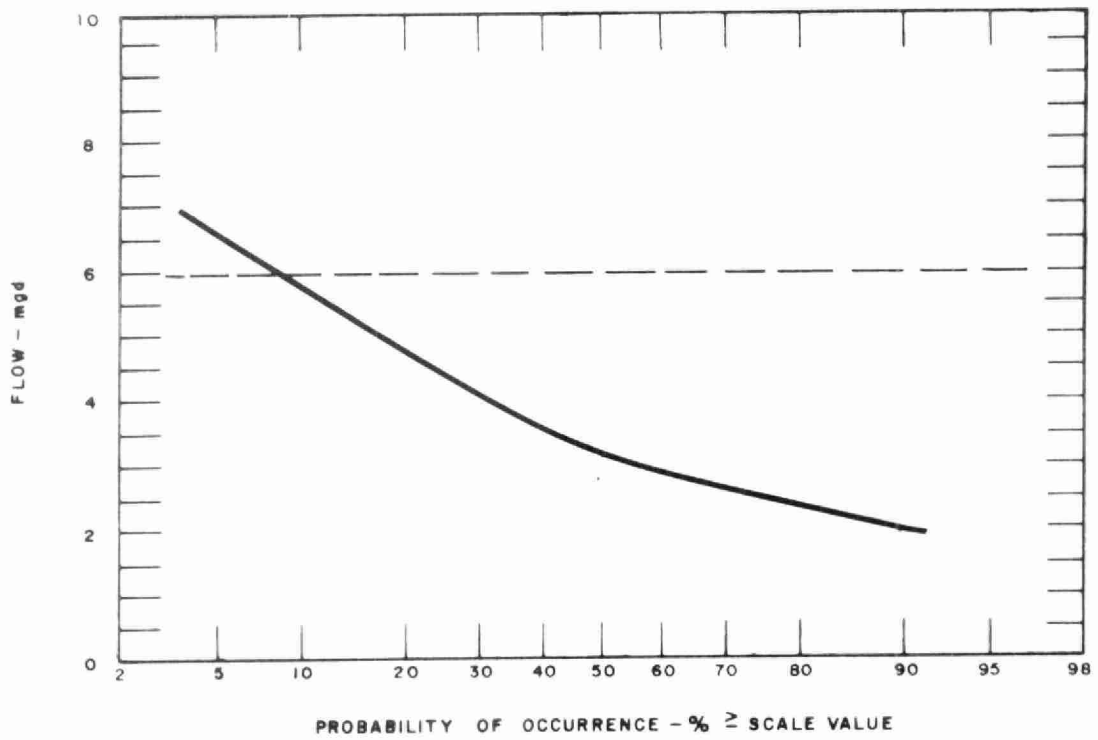
MONTHLY OPERATING COSTS

MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICALS	GENERAL SUPPLIES	EQUIPMENT	REPAIRS and MAINTENANCE	SUNDRY *	WATER	TRAVEL
JAN	6400.04	5267.73	-	-	-	-	90.08	-	-	1029.63	-	12.60
FEB	5119.52	3751.62	-	-	724.95	-	200.32	-	-	379.47	53.41	9.75
MAR	6165.52	3678.24	-	-	690.95	36.80	136.45	-	152.00	1408.37	53.41	9.30
APR	7332.01	3701.76	-	-	627.95	1866.90	230.39	-	256.29	473.36	53.41	121.95
MAY	6832.50	4095.12	-	-	883.35	-	391.40	94.46	576.44	723.92	53.41	14.40
JUNE	5446.16	3786.25	407.59	-	672.95	-	298.77	66.41	42.00	109.33	53.41	9.45
JULY	8081.23	3566.77	440.84	-	1269.10	4.41	476.52	22.68	184.18	2009.91	106.82	-
AUG	7258.59	5395.31	661.92	-	-	12.35	298.26	-	75.75	675.20	-	139.80
SEPT	7255.55	3637.21	141.30	-	675.35	-	131.20	-	301.85	2304.13	53.41	11.10
OCT	5681.18	3591.78	-	-	691.75	-	204.15	127.56	25.20	979.23	53.41	8.10
NOV	6199.80	3804.34	-	-	694.15	-	399.09	17.85	167.88	990.21	53.41	72.87
DEC	8350.57	3583.50	-	-	1772.70	-	772.53	525.90	530.77	927.55	106.82	130.80
TOTAL	80122.67	47859.63	1651.65	-	8703.20	1920.46	3629.16	854.86	2312.36	12010.31	640.92	540.12

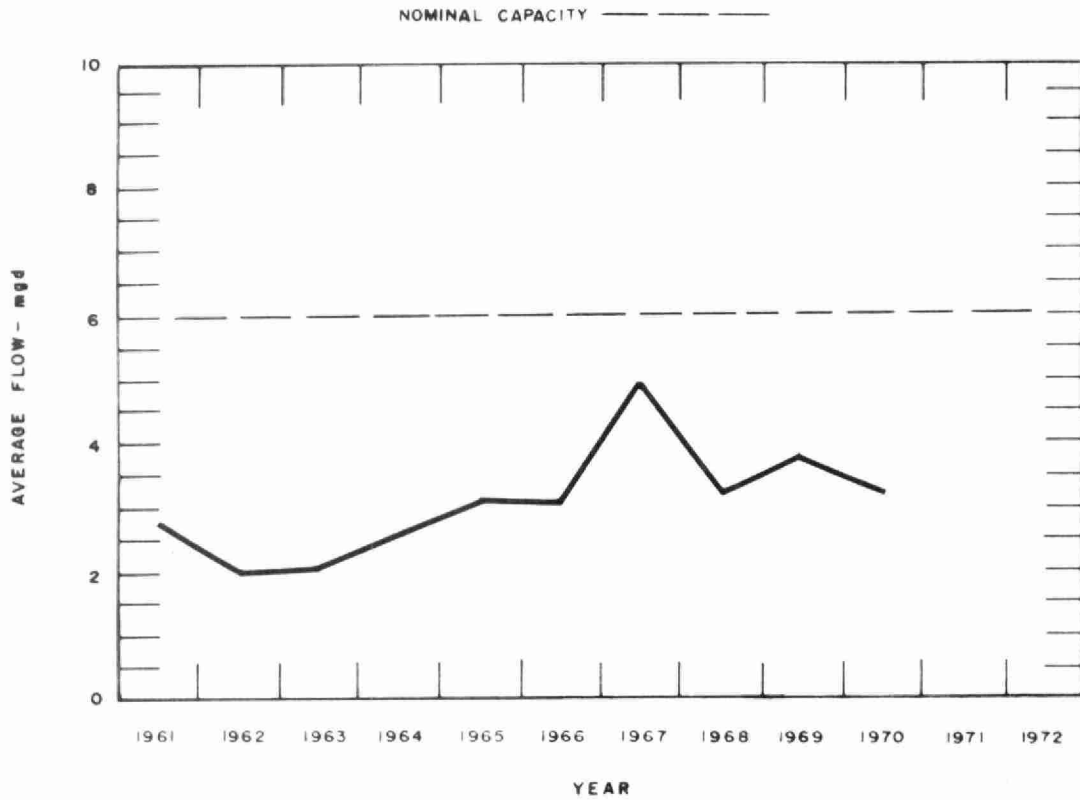
BRACKETS INDICATE CREDIT

* SUNDRY INCLUDES SLUDGE HAULAGE COSTS WHICH WERE \$11,259.36

PROCESS DATA

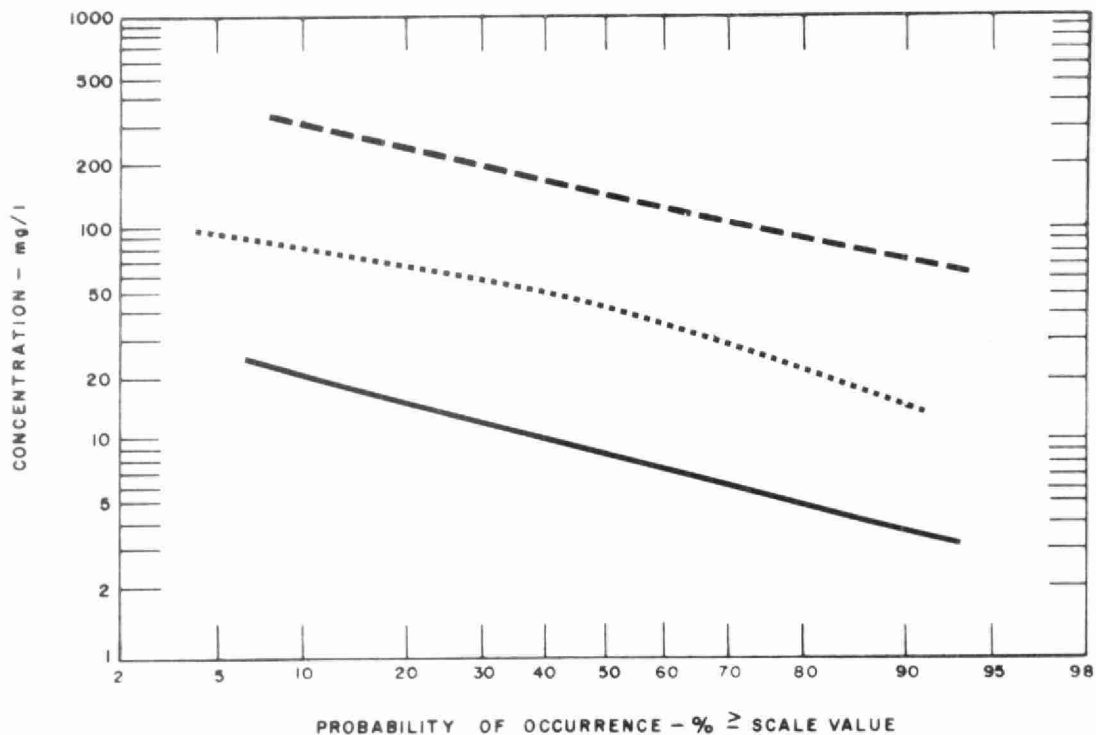


FLAWS

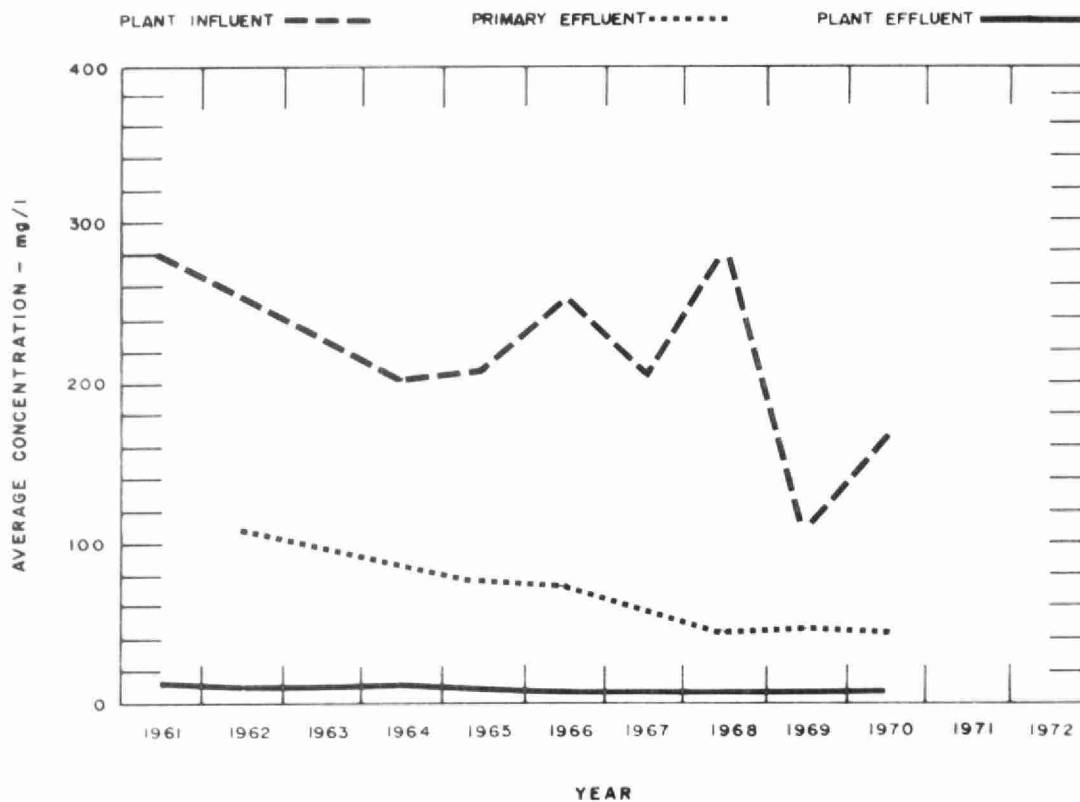


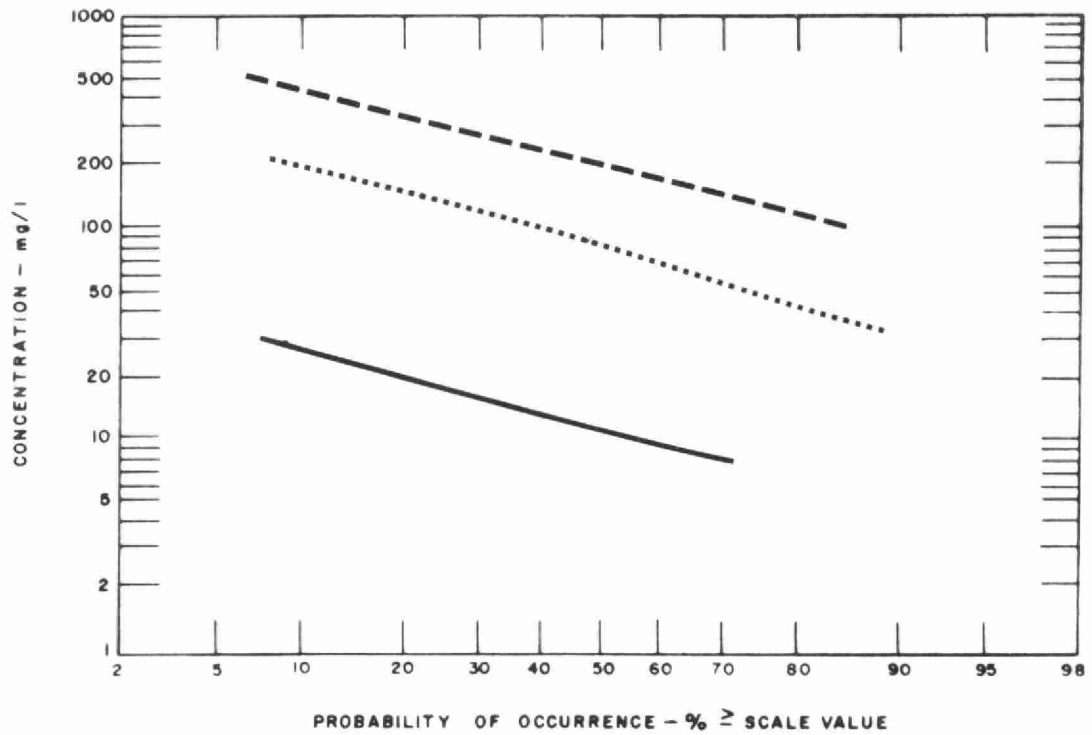
PLANT FLOWS and CHLORINATION

MONTH	TOTAL FLOW mil gal	AVERAGE DAILY FLOW mil gal	MAXIMUM DAILY FLOW mil gal	MINIMUM DAILY FLOW mil gal	CHLORINE USED 10 ³ pounds	DOSAGE mg/l
JAN	86.1	2.77	5.1	2.1	1.8	2.1
FEB	76.6	2.74	3.8	2.1	1.6	2.1
MAR	122.5	3.94	7.5	1.3	2.3	1.9
APR	147.9	4.91	12.4	2.8	2.7	1.8
MAY	104.4	3.38	10.4	2.0	2.4	2.3
JUNE	74.8	2.48	4.2	1.7	2.2	3.0
JULY	92.3	2.98	5.5	1.7	2.5	2.7
AUG	74.0	2.38	3.6	1.4	1.7	2.4
SEPT	85.9	2.86	6.5	1.6	2.0	2.3
OCT	94.6	3.05	5.3	1.7	2.0	2.1
NOV	104.4	3.48	9.8	1.2	2.4	2.3
DEC	114.6	3.70	7.8	2.4	3.4	3.0
TOTAL	11178.1	-	-	-	27.0	-
AVERAGE	-	3.22	12.4	1.2	-	2.3

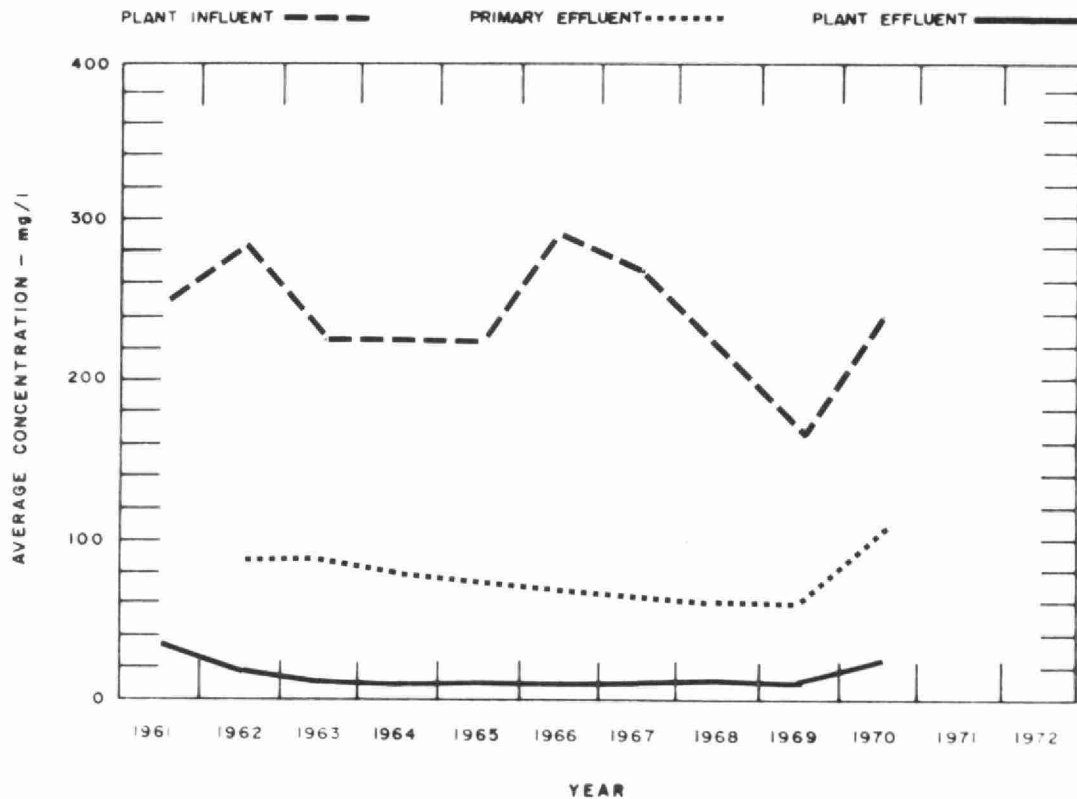


BIOCHEMICAL OXYGEN DEMAND





SUSPENDED SOLIDS



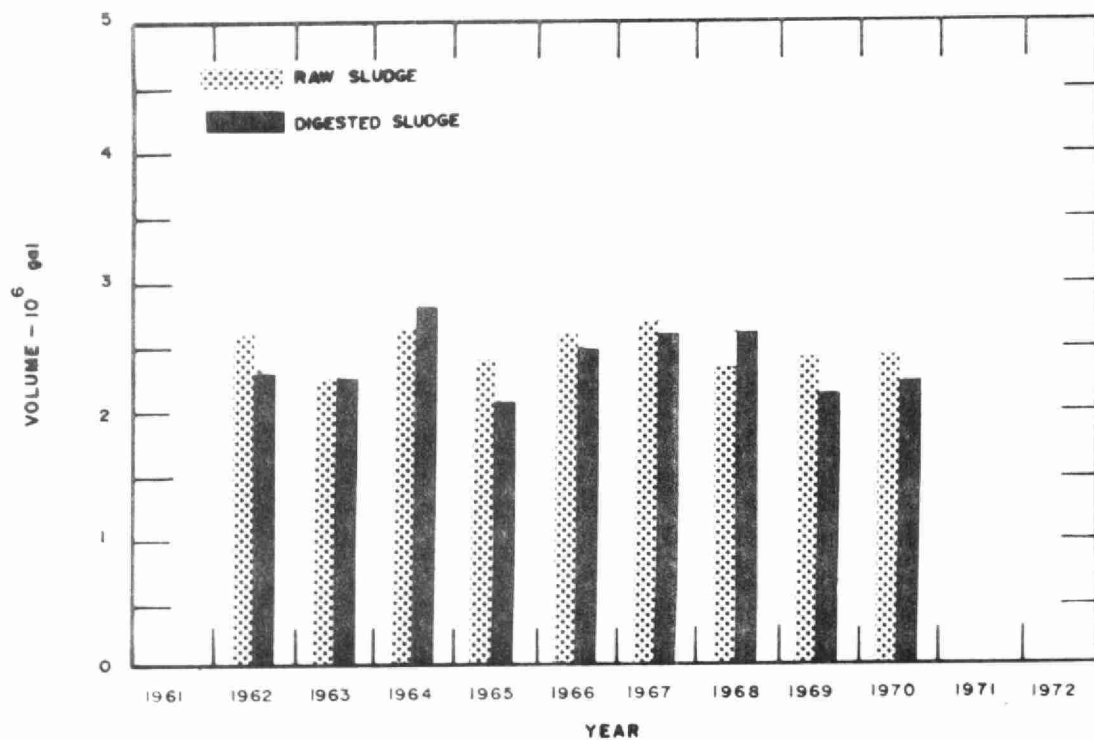
PLANT EFFICIENCY

MONTH	BIOCHEMICAL OXYGEN DEMAND						SUSPENDED SOLIDS						GRIT REMOVED cu ft
	INFLUENT		EFFLUENT		REDUCTION		INFLUENT		EFFLUENT		REDUCTION		
	n	mg/l	n	mg/l	%	10 ³ pounds	n	mg/l	n	mg/l	%	10 ³ pounds	
JAN	2	110	2	6	94	90	6	216	2	23	89	170	24
FEB	2	290	2	4	99	220	6	206	2	5	98	150	13
MAR	2	200	2	6	97	240	6	198	2	10	95	240	47
APR	2	170	2	6	96	240	6	163	2	8	95	240	54
MAY	2	180	2	3	98	185	6	191	2	5	98	190	123
JUNE	2	210	2	12	94	148	7	330	2	10	97	239	35
JULY	4	112	2	19	83	86	5	222	2	28	87	180	101
AUG	3	100	3	4	96	70	8	125	3	12	90	84	35
SEPT	0	-	0	-	-	-	4	510	0	-	-	-	80
OCT	2	130	2	6	95	120	4	325	2	8	100	300	27
NOV	1	85	1	6	93	82	6	190	1	5	97	356	29
DEC	1	130	1	2	98	147	6	321	1	10	97	356	30
TOTAL	23	-	21	-	-	-	70	-	21	-	-	-	598
AVERAGE	-	154	-	7	95	148	-	238	-	12	95	212	-

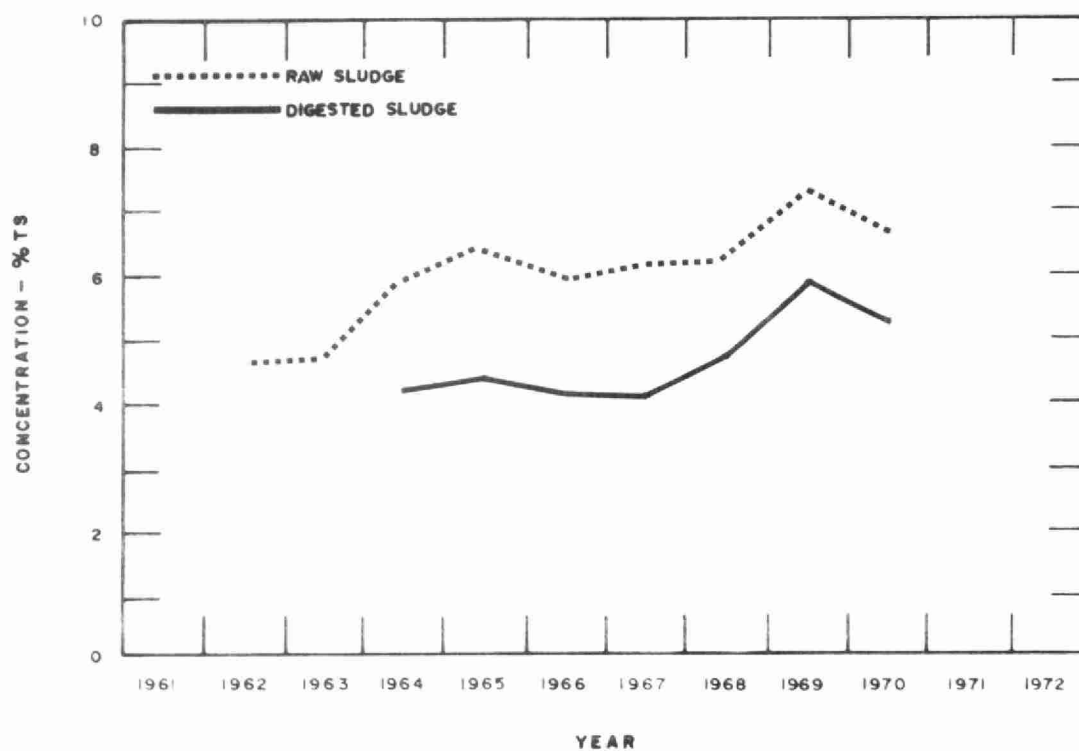
NOTE - n is the number of samples taken

AERATION

MONTH	AVG DAILY FLOW mil gal	AERATION INF.		SECONDY. EFF.		MLSS CONCN mg/l	F/M $\frac{\text{lb BOD}}{\text{lb MLSS}}$	AIR USED $\frac{1000 \text{ cu ft}}{\text{lb BOD}}$	WASTE SLUDGE 10^3 lb/day
		BOD mg/l	SS CONCN mg/l	BOD mg/l	SS CONCN mg/l				
JAN	2.8	82	118	6	23	2340	.10	1.6	1.4
FEB	2.7	45	109	4	5	2230	.06	2.9	1.7
MAR	3.9	58	82	6	10	2230	.11	1.6	1.6
APR	4.9	27	63	6	8	2070	.06	3.4	1.5
MAY	3.4	27	77	3	5	2170	.04	3.0	1.0
JUNE	2.5	36	149	12	10	2250	.04	3.8	.5
JULY	3.0	20	67	19	28	2040	.03	5.9	1.4
AUG	2.4	44	57	4	12	1500	.02	9.7	.3
SEPT	2.9	-	147	-	-	2090	-	-	.7
OCT	3.0	33	158	6	8	1750	.06	3.6	.6
NOV	3.5	50	114	6	5	2160	.09	5.3	1.2
DEC	3.7	40	131	2	10	2410	.06	5.5	.6
TOTAL	-	-	-	-	-	-	-	-	-
AVERAGE	3.2	42	106	7	12	2100	.06	4.2	1.0



DIGESTION



SLUDGE DIGESTION and DISPOSAL

MONTH	RAW SLUDGE			DIGESTED SLUDGE			SUPERNATANT		SLUDGE DISPOSAL	
	VOLUME 10 ³ gal	TOTAL SOLIDS %	VOL SOLIDS %	VOLUME 10 ³ gal	TOTAL SOLIDS %	VOL SOLIDS %	VOLUME 10 ³ gal	TOTAL SOLIDS %	DEWATERED cu yd	LIQUID cu yd
JAN	170	6.6	72	84	4.7	61	0	-	-	497
FEB	152	6.6	74	324	4.7	67	0	-	-	1925
MAR	180	7.1	73	104	6.2	-	0	-	-	616
APR	180	8.6	73	164	5.4	57	0	-	-	973
MAY	230	7.5	64	202	5.9	63	0	-	-	1179
JUNE	191	6.9	52	263	5.6	60	0	-	-	1561
JULY	200	7.5	70	140	5.3	60	0	-	-	805
AUG	223	6.6	64	180	5.9	52	0	-	-	1054
SEPT	222	6.3	63	220	4.4	51	0	-	-	1295
OCT	250	5.6	51	220	5.2	53	0	-	-	1309
NOV	224	5.3	73	97	4.3	61	0	-	-	574
DEC	251	5.3	65	320	3.8	58	0	-	-	1897
TOTAL	2473	-	-	2318	-	-	0	-	-	13667
AVERAGE	-	6.7	66	-	5.1	58	0	-	-	-

[illegible]



Water management in Ontario